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ABSTRACT

A research project was conducted to examine the interactions between the social networks of young adolescents and their computer usage. Particular attention was focused upon whether computers tend to isolate youthful users. Adult anxiety regarding the damaging effects of computers on children was assessed. Parental involvement, orientation to computers, and gender were the main variables studied. A case study approach was employed to gather observational data regarding the variety of interactional networks that framed the computer experience of a convenience sample of 32 subjects. The data were analyzed in terms of the reflexive co-construction of computer-oriented behaviors and their social interactions. The findings challenged the notion that heavy youthful computer users experience social isolation. Rather it was found that the interpersonal lives and computer activities of early adolescents reflexively amplified each other. Lower involvement of parents resulted in higher rates of peer socialization. Computer gaming was found to promote sociation under certain conditions. Online communication led to interpersonal communication in the presence of preexisting peer relations. It was also found that boys were more likely to socialize in relation to computers than were girls. The data were explained as consequences of context and gender-based differentiated styles of world-creating activity. Based on the findings, recommendations were made to parents encouraging a less fearful outlook on computers, and suggestions were offered on how teachers and parents could foster the integrative and developmental use of computers. (Author/LPP)

Early Adolescent Social Networks and Computer Use

Myron Orleans & Margaret C. Laney ■

Abstract

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Introduction

Popular and scholarly discussion of children and computers has generally lauded the educational benefits of home computers for children (Schall & Skeele, 1995; Williams, 1994). Perhaps 40% of the children in the United States have regular access to a home computer, and while usage varies, parents generally expect that their children need to use and will use a computer regularly (Green, 1996). At the same time, however, concern has been expressed regarding the possible isolating effects of computers on children. Consideration of the presumed nonsocial nature of computers has led some to conclude that regardless of instrumental benefits, excessive preoccupation with computers may pose a danger to adults as well as to children (Kupfer, 1995; Stoeltje, 1996).

Children's use of computers may affect their personal lives, family relationships, and peer adjustment. Since computers constitute a significant and growing proportion of children's lives (Welch, 1995), it is not surprising that concerns have addressed the possibility that children will experience a diminution of social relationships. Fears have been expressed that children's physical, personal, and social development will be impaired by excessive computer usage (Dorman, 1997; Miller, 1993).

Fear of the isolating effects of technology is not new, nor has it escaped the attention of researchers (Talbott, 1995; Turkle, 1995). Media critics have frequently proclaimed that television, music, video games, as well as computer games, have reduced children's social interaction (Hanson & Maxcy, 1996; Smith, 1995). Personal computers may have now taken over television's prominent position as the newest, feared piece of technology in the home (Coffey & Stipp, 1997). The anxiety felt by some adults has not apparently impacted the teenagers themselves who seem to view the technology favorably ("Teenagers and Technology," 1997).

Parental dread of children's computer misuse is further enhanced by distorted media depictions. For example, a popular movie, *Hackers* (Wickstrom, 1996), portrays adolescents as cyberjunkies who compromise banking procedures, change television programming, and twist government policies, but who do not participate in sports and barely associate with anyone outside their computer-related culture, including their families. Magazines and newspapers have also contributed to the environment of anxiety with articles such as "Child Molesters on the Internet" (Trebilcock, 1997), "Snared by the Net" (Rogers et al., 1997), "Internet Dangers (How to Protect Our Children)" (Rubenstein, 1996), and "Are We Creating Internet Introverts? Culture: Our Children Need to be in the Real World" (Shulman, 1996).

An assumption behind this critique of children's computer use is that a limited reservoir of time and energy is available to devote either to social or to "nonsocial" technological involvements. Zero sum thinking posits that technological activities necessarily reduce sociation because they sap time and energy. This approach fears the loss of the self and the social to the technology (Kupfer, 1995; Stoeltje, 1996).

Alternative conceptualizations utilized in this paper suggest that computers may actually promote certain kinds of sociations (Wellman, Salaff, & Dimitrova, 1996). Technology, in this view, may create occasions for social interaction and serve as topics of discourse. Rather than posit computer technology and social interaction as mutually exclusive options, this way of thinking poses the possibility of reciprocal and reflexive interplay between the two phenomena (Leeds-Hurwitz, 1995; Pearce, 1994). Computer use may be thus thought of as a possible foundation for social interaction as well as its product.

Specifically, this paper will offer a series of observations of early adolescent computer users, each of which illustrates kinds of children's sociation. Young computer users were observed in a variety of home contexts in order to depict diverse conditions. These observations were used to describe and analyze the patterned computer-related actions and interactions of the subjects. This kind of data does not permit empirical generalizations as to the proportion of children whose social life is enhanced versus the proportion whose social life is diminished by computer use. Rather the observational data permit the description of interactional patterns under varying conditions. These conditions include parental involvement, orientations to computers, gender, degree of peer integration, computer sophistication, and other variables.

Parents are likely to be important insofar as they configure their child's computer and establish parameters. Computational power and software capabilities are usually parental prerogatives related to their financial situation and their purposes in providing the child with computer access. A curvilinear relationship may well exist in which higher and lower levels of parental involvement either precludes preadolescent sociation or renders it unlikely. In the former, the parent might do so much for the youngster that he or she may just play the game or use the program set up by the parent. In the latter scenario, the computer may never be turned on for lack of guidance. Moderate amounts of parental consultation along with encouragement toward autonomy may predict the greatest likelihood of sociation derived from computer use.

Different orientations to computer use are likely to be associated with the quality and frequency of social interaction of early adolescents. For example, some young adolescents may use computers as tools of personal empowerment (Orleans & Walters, 1996). They may use the computer for self-expression, information access and productivity enhancement, and to demonstrate mastery of a complex technology. The functionalization of the child's personal computer in this scenario may impel him or her to try new computer activities, program, resolve problems, and continuously upgrade. While ego enhancement may drive some to do it all on their own, it is more likely that regular consultations with experienced peers would help early adolescent computer users become aware of new software, programming approaches, and trouble-shooting techniques. Thus, sociation may be promoted to the extent that the desire to perfect one's personal computer motivates the user to seek sophisticated assistance.

Children likely spend a great deal of time directly playing games against their computer. But gamers, especially adolescents, often get together to play computer games (Buchman & Funk, 1996). Increasingly, gamers are networked either in actual networks or via modems. Online services are offering gamers opportunities to play via their

proprietary services or at Internet sites. Game installations, including consultations providing technical support, sharing, shortcuts, codes, achievements, and ways of improving scores, may promote sociation. Thus, to the extent that gaming implicates others, the surround of game playing poses a possibility of social interaction.

While the online world may appear to some as a substitute for interpersonal communication, a virtual sociality that provides only a false sense of connection, it affords many opportunities for children to genuinely interact. Young adolescents may discuss the benefits of e-mailing, chatting, Web surfing, and the like. They can convince their own and peers' parents to allow online access, help each other to get online, share favorite sites, compare different plugins, discuss technical matters, and offer support for each other's online ventures. Since many young adolescents do not have their own computers, they may gather in groups to share online access. Additionally, some children may find it more fun to go online together even if they have their own systems. Thus, virtual social worlds and actual sociality can reciprocally coexist.

The characteristics of early adolescent gender-based groups impact sociation experiences (Lever, 1988; Fine, 1988). Research on male groups suggests that activities and tasks constitute the prime focus of interactions. Communication regarding computers would seem to meet the standards exemplified in male groupings. There may well be an affinity between male sociation patterns and interaction concerning computers (D'Amico, Baron, & Sissons, 1995; Kinnear, 1995; Whitley, 1997). Since female groups have been found to be more oriented toward socializing itself rather than toward activities or tasks, it may be less likely for female adolescents to use computer issues as a resource for sociation. On the other hand, computer involvement might prove less likely to produce isolation among young females because of their direct orientation toward sociability. Thus, gender may impact computer-related sociation of early adolescents in four ways: (1) isolate males who are not involved in computer support social groupings, (2) integrate males who use computer-related communications as grounds for sociation, (3) somewhat reduce female sociation by promoting individual computer activities, or (4) somewhat promote female sociation if females seek social support for their computer activities.

This paper explores parental involvement in their child's computing, how the child uses the computer, and how gender affects the patterns of sociation children experience in relation to computing. It is predicted that the circumstances of computer use rather than the technology itself influence the degree and type of sociation experienced. It is further anticipated that computing and social activities reflexively operate under some conditions to produce enriched interactional opportunities. These conditions will be examined in detail, but it is expected that moderate levels of child autonomy, striving for computer mastery, networked computing, group legitimation of computer activities, and gender will affect the social dimension of computer use.

Method

Sample

The researchers selected a convenience sample of early adolescents that included their own children, their children's friends, and their friends' children. The researchers selected subjects in terms of their availability for extended observation under a variety of circumstances. These circumstances arose in the natural course of home life and presumably reflected typical conditions under which the subjects used computers. It was hoped that this selection technique would yield richer observational data than that of a more scientifically selected sample.

A total of 32 children were observed in home settings, usually on three occasions for an average of about one hour each. Children were observed as they did computer work on their own and with others. The children ranged in ages from 8 to 17 with a mode of 14 years. The families of the children could all be classified as middle income. Twenty-six were European American children, and the remainder were Asian, Mexican, and African American children. Eleven were female, and all of these were European American.

Procedure

The subjects were observed in the natural settings of their home environments as they spontaneously used computers for their own purposes. The subjects were not informed that they were specifically being studied in terms of the social dimensions of their computer use, but they were informed that a research project was being conducted, and they or their parents did provide

consent. The subjects did not know or appear to care about the purposes of the investigation.

The researchers asked the subjects if they could "hang around" while the subjects used their computers. The researchers lounged in the room, remaining quiet for the most part. They did talk sometimes in order to account for their presence. They walked in and out of the computer room occasionally, visited with other adults in the home briefly, and even did some "housework" to relax the subjects and promote a casual atmosphere. Detailed notes were written down after the observational period was ended.

Instrumentation

The researchers followed an explicit protocol requiring them to observe the communicative behaviors of the young subjects while they were computing. Communicative behavior was defined as any act in which meanings were shared interpersonally. The researchers were particularly alert for opportunities to study kinds of circumstances that elicited social involvements. Groups of subjects were observed in terms of the content of their sociation to measure the influence of the computer as a factor in their interaction. Topics of talk, sequences of speech acts, and interaction chains of talk were noted and analyzed after each observational occasion. The format of the subjects' communication was also examined in terms of the implicit rules and procedures used. Turn taking, lengths of speeches, pauses, listening behavior, and leave-taking techniques were also noted.

The subjects' computing behavior was closely observed. Distance from face to monitor, intensity of focus, nonverbal expressions, use of keyboard and mouse, manipulation of physical objects, such as diskettes and CD-ROMs, and virtual objects on the monitor were scrutinized. How frustrations were expressed was of particular concern, and close attention was paid to the circumstances under which help was sought and from whom. Specific attention was given to how the subjects produced their conversations, how they created a meaningful sense of their computer actions, and how their speech acts shaped their computer-situated identities. Since both individual computing behavior and social computing behavior were observed, comparisons could be made of the relative satisfactions derived from each type of computing activity.

Interpretation

The resulting qualitative data were analyzed from a symbolic interactionist/social constructionist approach (Leeds-Hurwitz, 1995; Pearce, 1994). Concepts such as significant gesture, meaningful symbol, social cues, and meaningful interaction derived from the former were used to examine the process of sociation (Blumer, 1969). Social constructionist notions of reflexivity, reality definition, meaning creation, and internalization/externalization served as the backdrop for the explicit analysis of how the social interaction of early adolescents is affected by computers (Orleans, 1991).

Findings

Parental Involvement

Perhaps the most computer-pervasive home observed was one in which the father, who worked for a computer company, had a personal computer and laptop computer in the bonus room over the garage, and had purchased a computer for each of his three daughters, ages 10, 14, and 16. He had connected all the computers to a phone line, and all the computers had a modem and access to online systems. The father taught his daughters how to use their computers. As his daughters became computer literate, he spent less time with them while they were using their computers unless they needed help, which was rare. Computers, however, remained a topic of face-to-face communication when they were not in use. The father, having set up the girls' computers, reduced his involvement in their computer activities, allowing them to move to a level of comfortable involvement using their siblings as primary resources.

The 14-year-old seemed to display the highest level of commitment to the computer. She used her computer for schoolwork, mostly writing papers, and she played action/adventure games and a few learning games on her computer. Most of her computer time was devoted to participation in online chat rooms. She did not spend as much time as her sisters did on the telephone or with friends outside of the home. For her, socialization was mainly at school and at sporting events.

Her mother attributes the 14-year-old's high level of computer involvement and proclivity to socialize online to the fact that she had just started as a freshman at a new high school and had not yet established a new core of friends. The mother does

feel that the 14-year-old spends too much time on the computer, but the mother appears to accept this behavior as a mode of adaptation to transitional circumstances. Her tolerance gives the daughter tacit permission to emphasize virtual sociality. The parameters for computer use set by the parents encourage family interaction but also allow for some degree of isolation.

Another situation was observed in which a father configured the family computer and encouraged his two children, a 14-year-old son and an 11-year-old daughter. Since only one computer served the needs of all the family members, compromises had to be made. Each desktop was personalized under the direction of the father, and each child was set up with games and applications suitable to his and her needs. The children were observed to use the computer with some time conflicts and not very easy resolutions, but they were not observed troubleshooting or resolving problems on their own. The father took charge and dealt with issues as they arose.

Only sporadic sociation was observed of these two children and their friends. On one occasion, a profane version of a popular action game was introduced by one of the son's friends. The father noticed the activity around the computer and insisted on setting up the game to avoid configuration problems, even though he appeared to disapprove of the content. While the game was successfully installed, the son and his friend were distracted and engaged in other pursuits. Thus, the father's enmeshment precluded the computer serving as a resource in developing a stronger family bond.

Later on, it was noted that the father purchased a laptop for his son. After some initial sparring regarding who would take responsibility for the computer, the son established himself as being fully in charge of his own computer, denying the father any access to it whatsoever. Subsequently, by using online communication and interpersonal interaction, the son mastered the computer for his own purposes, principally online access. Groups of friends, once as many as four, visited him, or more precisely his computer, to get online and explore whatever resources and gain the experiences they wanted without the father's intrusion.

The daughter was observed to play computer games and also engaged in online searches for items of common interest with two friends on different occasions. However, their activities were geared only to using existing applications. The father was uninvolved in the girls' computer use, thereby permitting their free and spontaneous interaction.

In another circumstance, a 14-year-old son of a divorced father was seen to be struggling with program installation and optimizing his computer. His father also used the computer for business and personal reasons, but he only knew how to run his own applications. This father neither directed nor monitored his son's computer use. On one occasion, two of the son's peers were observed offering help, jockeying for the keyboard position, and trying different techniques to resolve a problem. Eventually, the father called in a computer consultant to optimize the computer's memory for some games, but the boys did have an opportunity to interact regarding the problem.

In these limited instances of parental involvement in their children's computer use, what became apparent was that the greater the autonomy the child was given, the more social was his experience. No instances were observed in which a child did not use his or her computer at all because of lack of parental guidance. Indeed, parental guidance seemed to dampen children's sociation with peers. Given leeway, the young computer users seemed to be stimulated to seek support from and involvement with their peers.

An observed situation further confirmed this point. A 15-year-old male who was very active in scouting, school, and sports received a new PC after having owned an old Apple computer that he used just as a word processor. A friend came over to help him set up his computer. There was a great deal of interpersonal communication between the two boys. Conversational privilege was held by the boy helping the other to learn the capabilities of the new PC. The 15-year-old's father entered the conversation with many questions regarding his son's new computer. Both boys tried to help the father understand the computer and made him feel welcome in the conversation. In this case, the father's lack of knowledge facilitated not only peer interaction but father–son communication as well.

Child's Orientation to the Computer

Configuring the Computer. As noted in the above section, much of the socially discursive activities of the subjects concerned configuring the computer. A substantial amount of time of any computer user is

spent fiddling with the computer itself, customizing it, trying to get it to run a particular program the way the user desires, and optimizing its use of resources. This nonproductive work may itself account in part for the popular fascination with the technology. The very incompleteness of the computer requires a commitment on the part of the user. He or she must invest substantial time and energy in mastering the technology and using its power. While the gender dimension of this issue will be examined later, here it is imperative to delineate in some detail a circumstance under which the need to configure the computer provided an occasion for sociation.

Four males were observed while they were setting up and networking the eldest boy's new Nexstar 586 computer. Three of the boys were in their family residence, and the fourth was a friend. The youngest was 8 years old, the oldest was 17, and the other two were 14 and 15 years of age. The 15-year-old and 8-year-old were half brothers, and they shared a room rich in childhood technologies.

The delicacy of the operation matched the intricacy of the communications. Whoever sat at the keyboard dominated the conversation. Whenever one of the boys was programming the computer, his conversation consisted mainly of unemotional exchange of information. For the most part, the talk was pointed and functional.

The three older boys each proposed ways of accomplishing the task. Questions and information was provided in short, quick phrases. Assistance was only given when asked and was received without rejection or demeaning tone. The conversational bits were abbreviated but flowed smoothly, with no noticeable interruptions or breaks in communication. There was a definite harmony in the conversation both during times of relaxation and of problem solving.

The oldest boy, while transferring programs from one computer to another, demonstrated a particular power narrative: During this process, he seemed to gain high status in the conversation. He maintained that privilege by physically staying at the computer and calling to others to approach to talk. A situated identity and high rank was generated by this subject's computer activities and consequent communication gambit.

Group solidarity and boundary definitions were established through the use of computer-embedded language. Terms brought into the conversation from computer experience served to deepen the level of meaning. The 8-year-old was unable to relate to this kind of talk and withdrew. As their computer activities unfolded, the older boys magnified their interpersonal communication.

The communicative rituals for initiating and terminating pieces of conversation emulated the sounds for opening and closing computer programs. The audio indicators they set up for the computer to signal errors were also used in their talk to express disagreement or to highlight a speech error. Their communication was reflexive of their computer activities that created the meanings and understandings of the terminology they used while talking. Communicative competence and computer mastery operated to integrate the older boys while excluding the situationally incompetent 8-year-old.

There was little eye contact between the boys while working on the computer. All eyes focused intently on the monitor even though they talked with each other. Their ability to attend simultaneously to more than one channel of communication was quite noteworthy and may have benefited from their routine of conversing while computing. Face-to-face communication took place only when the computer was loading programs and there was no need to view the monitor. During these times, facial expressions and hand gestures were pronounced. There was a great deal of joking and emotional venting referring to television and movies to certify their communicative competence. The topics of their conversation pertained to past, present, and future computer experiences, but they essentially affirmed a common bond.

This case illustrates the reflexive, self-constituting process of sociation while computing. The boys were configuring their computer while producing and legitimating their social life. The features of their communication acts were quite conventional, especially for early adolescent males. Power, position, structure, acceptance, and rejection were subtly negotiated and achieved. A microsocial world was created that was itself a product of these computer activities and provided the context within which these computer activities occurred. Thus, the social dimension of computing in this case was inextricably bound to the computing acts themselves, demonstrating that computer configuration can be an opportunity for peer sociation.

One further observation offers data on how the effort to achieve personal mastery over the computer may lead to sociation. A 15-year-old boy was observed working alone on his computer and appeared to be struggling with a particular program. He did not come out of his room and ask anyone for help. He remained alone in his room and persevered through his problem. After completing his project, feeling gratified, the boy turned off his computer and came out to talk with his father. He told his father what he had done and what he had learned about the computer. Computer mastery in this case served as an opportunity for character development, discussion, and solidification of the father–son relationship.

Gaming. Not long after these four boys set up the new computer, they were observed playing games on the system. On this occasion, there was even more social banter than previously. Even though the boys rarely sat facing each other, there was a great amount of interpersonal communication. They discussed the games they were playing, experiences they had while playing other computer games, and what they were going to do next. When other family members entered the room, the boys verbally communicated with them, but their eyes remained glued to the monitor. Computer games served not only as a focus of social activity but as a topic of discourse and as a frame through which to view ordinary communication.

The social dimension of gaming was best exemplified when children were able to network computers and play interactively. Such a situation was observed in which two brothers, 11 and 15, and a visitor, a 13-year-old boy, played an action game on two networked computers in different rooms. At first, the younger brother pouted around his computer as the visitor played with the older brother. At this stage, there was little direct communication as the two older boys hunted for each other via the network. Once they were able to locate each other and started blasting, the younger brother excitedly ran between the rooms, sampling the different perspectives and mediating the event. He facilitated the interchange of perspectives, helping each to interpret and anticipate the actions of the other. While he seemed to somewhat favor his brother, he also appeared gratified at the success of the visiting boy.

At the conclusion of one phase of the game, all the boys congregated in the older boy's room to review and evaluate the game. The spontaneous and effusive rhetoric punctuated the event, providing an opportunity for rich, emotional exchanges with promises for more interplay. During this debriefing period, the boys' face-to-face talk flowed with effective turn taking, many pointed questions, and some responsive retorts. The game formed the backdrop for their talk, while the subjective experience of it constituted the theme of the conversation. They minutely reconstructed the events; the feelings felt at the moment of contact, threat, and attack; and the sense of impending doom or triumph as each foresaw his fate. They offered alternative strategies and posed future scenarios.

The younger brother was the first to initiate a new contest, volunteering this time with enthusiasm to serve as the go-between. This time around, the competitors did not even finish their game before they all ran into the connecting hallway to needle each other, joke about their relative positions in the game, and promise horrendous consequences for the opponent. The younger brother, anxious to regain his role, hustled his brother back to his station, and the game resumed.

Once this game was concluded, the brothers rotated positions. The older brother then coached the younger in his pursuit of the visitor, allowing him to make a few mistakes before urging him to take particular actions. The alternating sequence of combatants, consultations, and coaching continued for nearly 3 hours that evening, with only the slightest hint of fatigue creeping in just before the parents terminated the session.

The occasion began on a rather chilly basis with one computer less than the number of youngsters to play. The boys adapted to the circumstance, organized their own activity, and regulated themselves, each finding a favorite position while sharing. They engaged in heated and fruitful discourse, experiencing active communication that may have significant socialization benefit for all involved.

A 16-year-old male was observed in a number of circumstances in which computer game playing was a prominent feature. He used his computer primarily to play role-playing games with his friends in his room or in theirs. He was not observed to sit alone, read, or do very much homework. He spent most of his time on the computer with his friends.

Generally, there was a very high level of noise in the room. Blaring music from the radio or the television added to the excitement over their computer activities, forcing the boys to converse rather loudly. Turn taking was observed to not flow very smoothly. Each participant wanted to hold conversational privilege at the same time. Each sought to impress the others with his expertise regarding the game being played or previous games. While the quality of communication was limited, observation of this subject suggested that game playing might bring this otherwise reclusive young individual into some pattern of relationship. While it could be argued that computer game playing constrained this subject's life, one wonders how he would fare socially without the computer.

These observations reveal diverse conditions under which early adolescents play computer games and experience social relationships. The observations demonstrated a range of consequences of game playing including topical talk, framing, mediating, perspective interchange, role sharing, self-organization, reconstructed logics, strategic discourse, impression management, and the like. When the subjects' mundane computer activities are viewed as sophisticated collective accomplishments, the socialization gain derived from these activities can be substantial.

Online. An increasingly significant proportion of children's computer activity is spent online. The subjects in the current study generally spent 60 to 70% of their computer time online. This time was by no means socially isolated time. Online communication was usually not a substitute for interpersonal communication, rather both often occurred simultaneously.

During one observation, a group of four adolescent boys ages 13 to 15 gathered around a laptop while the one at the keyboard reviewed some of the things that he could do. The three other boys were unfamiliar with online chatting and asked the knowledgeable youngster to demonstrate what he had boasted about. He entered a chat room and immediately offered to trade pornographic images. Once a few trades were completed to the satisfaction of the onlookers, the keyboarder proceeded to obtain sound files of highly valued rock songs.

One of the onlookers asked to take over at the keyboard and tried to obtain cartoon picture files. The more experienced user, now hovering over him, instructed him on the necessary lingo to use in order to appear competent for the virtual social circle in the chat room. The other boys were impressed with the achievement of their peer and asked to participate similarly. Expressions of enthusiasm and admiration were exchanged as each in turn demonstrated some capability. The boys rated themselves in relation to the expert in terms of the effectiveness of their efforts and stated intentions to learn the techniques more precisely. The unselfconscious solidarity of the group of boys was noteworthy. They formed a task group, organized it according to skill-based criteria, and produced plans for further enrichment. Perhaps the particular pursuits of these boys would not gain the endorsement of adults, but the proficiency with which the boys created a computer study group and communicated about the technology suggests that collaborative online activities emerge readily among these adolescents.

A similar observation of two adolescent male friends revealed that online communication provided opportunities for the youngsters to manipulate the self and manage impressions. They were talking to each other on the phone and over the same bulletin board system with a third party they had just met online. The two pretended not to know each other online and enticed the third into playing a computer game over the modem. They also pretended to be visitors to the area and unfamiliar with computers. They asked the third for help on how to work certain systems. The boys had a fun time "suckering" the third. The observed subject exhibited highly animated facial expressions and body movements. The two verbally expressed their pleasure over the phone to each other, joking and touting the success of their deception. While the social ethics of this encounter may be questionable, the opportunity to try on a variety of personas is one of the attractions and hallmarks of online activity. This behavior can contribute to the development of social competency among adolescents.

A 16-year-old male was observed as he silently used the computer in the family room. He was just becoming familiar with the online world and haltingly sent e-mail and birthday greetings to relatives out of state. He took many breaks from the computer during which he spoke with others in the room about his online activities. He appeared very excited to be connected with others and magnified this sense by sharing it with others. Perhaps the

location of the computer in the family room, where so much relaxed discourse occurred, facilitated the family integration of the online computer-using adolescent. But this case suggests that online and interpersonal bonding may complement each other in certain circumstances.

Even when not using a computer for online activities, adolescents were observed to be using online access as a topic of conversation. During a car trip to a sports activity, three adolescent boys were overheard discussing online experiences. They particularly focused on Web sites that offered previews of computer games for downloading. One participant told how he was able to download an entire game for free from a site that no longer existed because of legal problems. The boys, not appreciating the issue of copyrights, were saddened to learn of the termination of the site. They also shared the addresses of sites that offered codes that permit movement between different levels of games, thereby avoiding the necessity to master each stage. They spoke of the relative benefit of diverse hacking programs and ways to obtain and enhance the more sophisticated ones. They concluded by eliciting promises from each other to exchange specific information and addresses via e-mail. While the morality of the conversation was certainly questionable, the boys did engage in a rather sophisticated conversation regarding online possibilities. They demonstrated the fluidity of youthful activities, indicating the inseparability of online communication and face-to-face communication.

Continuing this notion that communication for these youngsters did not fall into distinct categories, a 14-year-old was observed just after coming home from school, rushing to his computer, and getting online to communicate with peers he had just left. Online, they chatted in an obscure jargon about events and personalities experienced just prior at school. The online chatting served the same purpose as a telephone, but with the added dimension of launching the participants into wider arenas of communication. Right after the school topics were exhausted, the boys wandered into chat rooms and engaged in discourse with others as well as with each other.

This case and other instances belie the claim that online communication in a virtual world created on the computer draws young people away from actual communication in the real world. Indeed, it may be more accurate to contend that virtual and real communications reflexively construct each other. While either can occur without the other, they do in fact implicate each other for the adolescents described in this research. Thus, adolescents bring their everyday real world experience to bear upon their online virtual communication. Reflexively, they integrate their online life into their ordinary talk.

Gender. Far more of the instances cited above refer to male rather than to female adolescent socialization as a consequence of computer use. While the girls under observation demonstrated substantial personal capability with computers, it was comparatively rare to find girls sharing computer interests and activities. Most of the female subjects performed their computer actions alone, and computers did not discernibly enter into their conversations.

However, there were some instances of female sociation related to computers. A 10-year-old girl was observed to focus her friendship activity around her beanie baby collection. Two of her peers visited her room and rummaged through her holdings, checking for particular items. One pointed out that some important babies were missing. The girl had noticed that a Web page address was included on the tag of some of the babies and asked her father to help her get online to check for the availability of the missing baby. Once she found the page, she printed out the inventory and went about ordering the item. At the behest of her father, her 13-year-old-brother then helped his sister and her friends find a chat room organized around beanie babies. The girls experimented with computer chatting for awhile but soon abandoned this activity to return to playing together with the beanie babies. The girl was willing to use the online world functionally, that is, to shop, but did not choose to surf around and check out a variety of relevant sites, nor was she or her peers particularly entranced by the chat option. Her main interest was in the beanie babies rather than the technology that permitted broad exploration of different ways of relating. The communication with her peers did not center on the online access and, in fact, was not raised in subsequent conversation.

While many of the girls observed for this study displayed high levels of computer sophistication while spending time on the computer, their expertise was seldom heard to be a topic of conversation. A female, aged 12, was observed

over a period of time to assess the level of social interaction she experienced as a consequence of her computer activity. There were two computers in the home, one for her and one for her stepfather. She used her computer for browsing the shopping list on a commercial online service. She wrote her papers on the computer and e-mailed to out-of-state cousins. She frequently played games on the computer including one game with her parents. Her stepfather taught her how to use a money management program. But mostly, she used the computer alone in the den with no verbal communication with other family members. While she had comparable skills and access, she used the computer less than the boys. When friends came over, she rarely used the computer with them. They played outside on bikes or rollerblades, or in her room. Her computer usage was limited to weeknights after homework or when no friends were around to play with her on weekends. For this 12-year-old girl, the computer was a device that served certain personal needs and had some role in her relationship with her parents, but it had nothing to do with peer socialization.

Other female subjects who were similarly adept with the computer kept the computer separate from their social lives. The three sisters, ages 10, 14, and 16, discussed above, all used their computers effectively, but they spent a greater amount of their time socializing outside the home or on the telephone. Even the 14-year-old, who was the most consistent computer user among the sisters, did not mix her limited social life with her computer. While her 10-year-old sister was observed to spend her time on the computer mainly alone, she did talk to the computer and verbally shared things she learned on the computer with anyone in the family who happened to be around. The actions of the youngest sister suggested the impulse to use the computer as a basis for sociality, but this tendency was not carried forth either by her or her older sisters.

Another gender differential in computer use that was observed was that girls, unlike the boys, rarely played music or had the television turned on while on the computer. The girls also used their computers more for homework than did the boys, who were more likely to play computer games. With exceptions, the girls were more likely to be serious about using the computer. They were more focused on using the computer for particular purposes, and their demeanor while using it was more somber than the boys. The boys seemed more likely to view the computer as a multipurpose toy that was itself fun to use and integrated it into their social lives. However comfortable the girls appeared with the computer, it occupied a marginal position in their world, sometimes substituting for genuine social contact and sometimes provoking an urge to communicate. The girls, however, did not seem to feel that it was legitimate to allow computers to serve as a social theme.

Discussion

The observations reported above suggest that certain conditions are more likely to promote sociation in relation to computer use. Young adolescents whose parents were less involved in their child's computing were more likely to socialize. Parental involvement at the system setup stage related to greater computer commitment and sociation except in cases where more knowledgeable adolescents were able to collaborate with peers to set up systems without the involvement of their parents. Computer gaming may promote sociation when computers are networked or when games are either a subsidiary activity or a topic of talk. Online communication may promote sociation when adolescents search for commonly valued items, find opportunities for social experimentation, demonstrate knowledge and skills held in esteem by others, and when they seek to extend established interpersonal bonds. Finally, it was found that boys were more likely to socialize in relation to computers than were girls.

These findings were uncovered using a selected, small sample of early adolescents utilizing an informal observational protocol. These are tentative points demonstrating some possibilities. Further scientific study using larger samples and more objective methodologies needs to be undertaken to substantiate the conclusions of this study or to generalize. Nevertheless, these findings are intriguing and beg for explanation.

Although it was predicted that moderate parental involvement would result in the most socially fruitful use of computers, it was found that minimal parental involvement had the most salutary effect. These adolescent subjects sought to create their own social-computer world, gaining pride and a sense of community in the process. Parents were only desired when the subjects' own knowledge

was lacking or for recognition of an achievement. When they had the skill to personalize and customize the computer or network and empower themselves to carry out their own projects, the subjects seemed most interested in sharing their experience with peers. In this condition, they viewed the computer as their own product worthy of presentation to peers and a signification of their competency (Fine, 1988).

The subjects who socialized also sought to structure their collective experience around the computer, delimiting their boundaries for acceptance, regulating their own activities, and ranking themselves. Their prolific computer talk objectified the micro-world that they created, firmly legitimating it as a tangible world, worthy of its own language, ethics, and meanings (Berger & Luckmann, 1966). This world functioned best for them as an extension of other relationships but also as an accented dimension of those relationships.

For many of the girls who were observed, this kind of computer social world contradicted their taken-for-granted way of doing their normal business. That is, for them the ordinary world must prevail. The computer may be a useful tool, a transitional substitute for social bonding, but not something to take precedence over other aspects of their social life. Since their culture emphasized direct interpersonal contact and conversation regarding purely human phenomena, engagement with the computer as a prime focus of communication was not workable (D'Amico, Baron, & Sissons, 1995; Kinnear, 1995; Whitley, 1997).

That "boy culture" rather than "girl culture" permits the production of a computer-focused social world may have implications for the future, as computer expertise becomes the standard for achievement. Boys may gain or compound a competitive advantage as their culturally sanctioned avocation yields economically demanded skills. The development of computer skill among girls might well lag if it is based only on instrumental requirements. While the computer expertise of the girls observed in this study was substantial, the boys consistently devoted more time and energy to the computer. More importantly, the boys communicated about and thereby magnified their skills. Although the girls may have expressed pride in their achievements, computer skill communication was not a salient characteristic of their relationships.

Overall, it is clear that boys tend to socialize around the computer, while girls are more likely to do their computer work without compromising their sociality. Thus, for both sexes, there does not appear to be a diminution of social communication as a consequence of computer use. Indeed, there is some suggestion in this research that lack of computer knowledge hampers the ability of young people to engage in some forms of social discourse. Interactional skills, verbal facility, social identity formation, and group adjustment, particularly for the boys, were all positively associated with computer activity.

Since computers are prevalent in society, the economy, and the media, children who are only peripherally exposed to computers may be impaired not only occupationally but also socially in terms of today's conversations. Those adolescents, for whom the microsocial world of computers is an everyday experience, will more easily participate in macrosocial conversations regarding computers and related technological advances. The linkage between their interpersonal communication and the public policy discourse facilitates broader social integration. Rather than isolating adolescents, the social environment of computing may well prove to be adaptive.

Recommendations

Since this research did not find that computer use resulted in individual isolation and social decay, and in the absence of research that it does, it is recommended that the media abstain from emphasizing its dangers and threats to the common sensibility. Certainly, instilling fear and moral panic is more likely to sell copy than reassuring normalization; however, to pathologize computer use without adequate warrant does a serious disservice to our children and our future.

Certainly, parents need to be aware of their children's computer use. They need to be mindful that their own excessive involvement may rob the children of their chance for discovery and peer socialization. Parents would be well advised to allow their children the opportunity to enjoy the computer without dread of its putative dangers. Reasonable caveats and age-appropriate limits, along with wise selection of software, is likely to provide sufficient safeguards. Parents ought to be reassured that the computer is essentially a benign device, which certainly can be misused, but is most likely to prove of significant benefit. Indeed, since

computer and other informational technologies can promote family interaction, it is advised that families might focus more of their activities around computers (Kraut et al., 1996; Sun, 1995).

Children might be encouraged to view the computer as a social tool, with emphasis on networked capabilities and the need for a team approach. School administrators, parents, computer salespersons, and the like could be made more aware of the socializing benefits of computers for children (Porter, 1993). That is, instead of focusing on the computer as a means to promote individual productivity, the computer could be conceived as a component of a networked system, magnifying the power of each in the whole. School computer projects and outside assignments could be designed to promote collaboration (Schall & Skeele, 1995). Children would naturally gravitate to this network scheme and further their social benefit and preparation for the occupational world.

Similarly, the World Wide Web should be best understood in terms of a virtual social world intersecting infinitely with the actual social world. Our children are establishing their presence and communicating beyond their immediate social circles. They are discovering all sorts of representations of worlds within and beyond their familiarity and, one hopes, are producing their own representations. Collective efforts of adolescents to participate on the Web would seem to easily flow from their involvement. Sharing and communicating interpersonally about the Web and the Internet, in general, is strongly advised, even if some pursuits may not suit conventional tastes. In any case, the sparse verifiable examples of children lured away from home by online predators or atypical stories of children losing their souls to "cyberaddiction" should not dissuade parents and adults from supporting moderate and appropriate use of the Internet (Orleans, 1997; Young, 1996).

The key recommendation derived from this study is to encourage girls to socially accommodate to the computer. While the girl-culture emphasis on the human in social interaction is critically important, it should not exclude the use of computers as a focus of activity or as a topic of conversation. How to engineer this interaction is, of course, problematic, but games and computer activities that encourage social interaction will likely entice girls' participation (Thomas, 1996; Vail, 1997). But with the recognition that girl's athletic programs are growing rapidly, perhaps in spite of culturally rooted prejudices, and that girls are preparing to enter into many nonconventional occupations, it is possible that adolescent girls can be motivated to approach computers as a feature of their social lives.

In sum, recommendations are offered that promote the sociation of adolescents in relation to computers. We have presented the reality of this phenomenon and its benefits. It is likely that in the future computers will be more integrated into all of our lives. Dystopic visions of a fragmented social world resulting from computerization will only hamper our capacity to adapt. A more embracing approach, starting with our children, will enable us to successfully encounter the social challenges posed by new technology.

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